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Screening and Early Recognition of Sepsis in Home Hospital and Home Care Patients

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Screening and Early Recognition of Sepsis in Home Hospital and Home Care Patients

DNP Project
Submitted in Partial Fulfillment
Of the Requirements for the Degree of
Doctor of Nursing Practice

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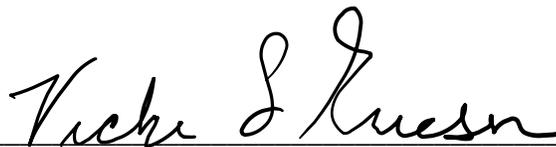
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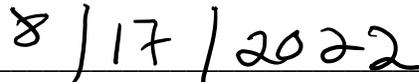May 2022

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This is to certify that I have examined this
Doctor of Nursing Practice DNP project manuscript
written by

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and have found that it is complete and satisfactory in all respects,
and that any and all revisions required by
the final examining committee have been made.

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Vicki Ericson, DNP, ANP-BC, FNP-BC

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8 / 17 / 2022
Date

DEPARTMENT OF NURSING

Dedications and Acknowledgements

I am so excited to be here writing this. I knew while sitting in my first nursing class in August of 2000 that I aspired to reach the pinnacle of nursing practice by getting this terminal degree. I believe that everything happens when it happens for a reason, and for that, I give credit to COVID-19. Without the "gift of time" brought on by the pandemic, I do not think I would have been able to achieve this goal. This time allowed my family, especially my girls, to see that patience, persistence, and perseverance have their rewards. You can accomplish anything if you look for the window of opportunity. Thanks and love to Mike, Addy, Anya, Mom, Dad, John, Carol, my classmates, and the rest of the gang for all your love, support, and patience.

I would also like to say a special thanks to those who have walked this journey with me. Vicki Ericson, my rock and my advisor, whose unyielding guidance has been invaluable. To Ruth Bryant, my other rock, who has taught me to always question. To my DNP Project Committee members Allison Starke, Heather Mendoza, Erika Blair, and Rachel Kuhnly, who guided me through the trenches of program development. To Dr. Emily Downing, whom I have worked with for years, who saw potential in this project and graciously sponsored it. Thank you to the home care nurses who work tirelessly and fearlessly for this population and put this project into practice. I literally could not have done this without all of you! Finally, a humble thank you to the patients whom this project served. You are the reason we exist and keep going; to assist you in achieving your best health.

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Abstract

Problem Statement: In 2018, septicemia was the number one diagnosis for hospital inpatient stays for ages 65-74 in the United States (Agency for Healthcare Research and Quality, 2018). Most hospital admissions due to sepsis come from the community- as many as 87% (Rhee et al., 2017). People over 65 are 13 times more likely to end up hospitalized due to sepsis (Sepsis Alliance, n.d.). Sepsis in Home Hospital Care (HHC) and Home Care (HC) patients is prevalent because these patients are typically over 65. HC and the HHC program within the project site have noted a rise in hospital readmissions due to sepsis. HC nurses do not always identify early sepsis signs and symptoms due to a gap in sepsis knowledge. Early recognition and prompt action can improve outcomes and decrease unnecessary hospitalizations in HHC patients.

Purpose: This quality improvement (QI) project aimed to provide sepsis education and sepsis screening tool training to HC nurses. The training was intended to increase HC nurses' ability to identify early sepsis signs and symptoms, improve patient outcomes, and decrease hospital readmissions related to sepsis.

Methods: A QI project provided sepsis education to 114 HC nurses who completed pre, post, and 5-week follow-up questionnaires that measured staff knowledge of sepsis's early signs and symptoms. Education occurred over two mandatory HC nursing staff quarterly meetings, and data collection occurred before and after the meetings.

Results: Due to various intervening factors, only three HC nurses completed the pre-sepsis knowledge assessment; only 1 (33%) completed the post-sepsis assessment. This participant did not complete the 5-week knowledge retention assessment. The post-sepsis knowledge assessment score (10 out of 16) was one point lower than the pre-sepsis knowledge assessment

score (11 out of 16). 5 HC nurses completed the 5-week sepsis knowledge retention assessment.

The average score ranged from 10 to 15 (62.5% to 93.7%) out of 16.

Conclusion: The implementation of sepsis education for HC nurses successfully educated 114

HC nurses; however, participation in the sepsis knowledge assessments was very poor. As a

result of poor participation, a conclusion cannot be drawn as to whether or not sepsis education

was directly related to increasing HC nursing sepsis knowledge.

Keywords: Sepsis, Screening, Early Recognition, Home Care Patients, Home Hospital Care

Screening and Early Recognition of Sepsis in Home Hospital and Home Care Patients

Sepsis is a term that has been at the forefront of acute care since the inception of the Surviving Sepsis Campaign in 2002. After 20 years, the term sepsis is finally trickling its way into the community, where it belongs, as this is where the majority of sepsis cases start. Sepsis is both the number one hospital diagnosis and source of expenditure nationally. Sepsis is the twelfth leading cause of mortality in the United States (Prest, Sathananthan, Jeganathan, 2021) and was responsible for 20% of all deaths globally in 2017 (World Health Organization, 2020).

Sepsis is not a specific disease state but a conglomeration of symptoms that make up a syndrome that is perplexing, subtle, not yet well understood (Singer, et al., 2016), and deadly. Home care nurses, patients, and their families armed with sepsis knowledge through sepsis education may recognize the signs and symptoms of sepsis earlier. Earlier recognition of sepsis may lead to an increase in lives saved, decreased hospitalization, increased patient outcomes, and financial benefit to both patient and healthcare systems.

Background

"Sepsis is life-threatening organ dysfunction caused by a dysregulated host response to an infection (Singer, et al., 2016). In other words, it is an overreaction of the body's response to an infection. Most people think of sepsis as an in-patient issue; however, as stated earlier, as many as 87% of septic episodes come from the community (Sepsis Alliance, n.d.).

Despite the Centers for Disease Control (CDC) and Prevention considering sepsis a medical emergency, only 65% of Americans over 18 were familiar with sepsis in 2018 (Radius, 2018). This lack of awareness presents an emergent situation in itself, as sepsis affects nearly 1.7 million people in the United States annually and kills approximately 350,000 people yearly

(Sepsis Alliance, 2022). Of those patients who die in the hospital, one in three dies from sepsis (Centers for Disease Control and Prevention, 2021).

Sepsis can affect anyone; however, people over 65 are 13 times more likely to end up hospitalized due to sepsis (Sepsis Alliance, n.d.), primarily due to the co-morbidities that put them at risk for sepsis. Co-morbidities that increase a patient's risk for sepsis include chronic diseases such as chronic obstructive pulmonary disease (COPD), diabetes (DM), and heart failure (HF). Sepsis in home care (HC) patients is prevalent because these patients are typically over 65 and comprise a significant portion of the population, about 4.5 million in 2015 (Centers for Disease Control and Prevention, 2020).

Due to identifying a sepsis knowledge gap among nurses in the in-patient setting, a sizable amount of quality improvement initiatives involving hospital-based nurses have been implemented to decrease the incidence of in-patient sepsis and sepsis mortality (Armen et al., 2016). Quality improvement in early sepsis identification was accomplished through nursing sepsis education, sepsis screening, and treatment protocols.

Despite successful in-patient sepsis identification initiatives, sepsis continues to plague the healthcare system in the form of hospital readmissions due to sepsis from those in the community. The identification of increased sepsis cases within the community has shifted the focus of early sepsis identification from the in-patient setting to the outpatient or community-based setting, including HC. It is critical to remember that up to 87% of all sepsis episodes come from the community (Rhee, et al., 2017.).

A knowledge gap has also been identified among home care nurses and community laypeople regarding early recognition of sepsis signs and symptoms; however, little information was found in the literature to reflect how many home care providers this may affect. A study by

Fay et al. (2020) noted that of 1078 adult patients with sepsis, 24.1% had an outpatient encounter within seven days of admission and that sepsis hospital readmissions could be modified with early recognition by home care providers, patients, and families through education (Paoli, 2018). The study by Fay et al. (2020) emphasizes that early sepsis recognition is the key to preventing sepsis, improving hospital readmission rates, and overall mortality from sepsis.

This project focused on educating all HC nursing staff (n=134) and HHC program providers/staff (n=9). Sepsis screening occurred within a subset of HC patients who participated in a HHC program. HHC providers/staff were included in the education to enable continuity of care and provide a common sepsis knowledge base between the groups. The HC nurses would contact the HHC providers for a positive sepsis screen. The HHC program is a new initiative recently started in a large Midwestern Metropolitan healthcare system. Patients discharged to the HHC program are medically complex and have a higher average severity of illness score (SIS) at the time of hospital discharge. The SIS is derived using a validated tool that measures various factors and results in a score that can then be used to identify patients needing a higher level of care after hospital discharge. In addition to the standard home care services, HHC patients receive a community paramedic (CP) visit on the day of hospital discharge. The CP sets up and educates the patient/family on using the Biometrics kit, which consists of a tablet, blood pressure cuff, oximeter, and thermometer. The biometric equipment utilized by the HHC program has Bluetooth capabilities to wirelessly download patient vital signs, which are monitored remotely twenty-four hours a day by nursing staff. This tablet stores the vital signs and is used during virtual visits by HHC providers. Other HHC services included a cadence of virtual telehealth provider visits by a nurse practitioner (NP) or medical doctor (MD), 24/7 access to triage and on-call provider, respiratory therapy (RT), in-home labs, in-home imaging, pharmacy, and a

biometric home monitoring kit (Kuhnly, 2020). The goals of the HHC program are to reduce

hospital length of stay, enhance the patient experience, lessen hospital readmissions, and

circumvent hospitalization if possible (Kuhnly, 2020).

Problem Statement

In 2018, septicemia was the number one diagnosis for hospital inpatient stays for ages 65-74

in the United States (Agency for Healthcare Research and Quality, 2018), as we know, most of

which comes from the community. HC nurses do not always identify sepsis signs and symptoms;

early recognition and prompt action can improve HHC program patient outcomes and decrease

unnecessary hospitalizations.

Needs Assessment

This DNP project took place in a Midwestern Metropolitan HC division of a large

healthcare system. The goal of the HC division is to provide aid, awareness, and a helping hand

to enable patients to remain as independent as possible in the comfort of their homes.

Both traditional HC and the HHC program have seen a rise in hospital readmissions due to

sepsis. A root cause analysis prompted by the rise in hospital readmissions related to sepsis

found that HC nurses do not receive early sepsis recognition training. While there is no single

solution to preventing sepsis, research evidence demonstrates that early recognition of sepsis

improves outcomes. Therefore, HC nurses must clearly understand the signs and symptoms of

early sepsis and the need for sepsis screening. This project idea was submitted to the health

systems research scientist who oversees all quality improvement projects. The proposed

interventions to improve early sepsis identification in home hospital care patients was deemed

feasible, meaningful, and approved for further planning.

Significance and Contribution to the Literature

Although there is an abundance of information published regarding the benefits of educating nurses on sepsis screening and early identification of hospitalized patients, a gap in the literature was noted concerning sepsis education for HC nurses. This knowledge gap among HC nurses was identified as a barrier to optimal health for HC patients, potentially resulting in increased hospitalizations and poorer patient outcomes.

Significance to the Nursing Profession

The ultimate goal of this quality improvement project was to contribute to the nursing profession by closing the sepsis knowledge gap among HC nurses. An attempt was made to focus on and provide sepsis education and sepsis screening tool training to all HC staff and HHC providers'/staff. Other goals for this quality improvement project included improving HC sepsis knowledge. The intention was to effect direct patient care through early identification of sepsis in HHC patients, which may impact and eliminate potential barriers to optimal health, leading to better patient outcomes. A final goal for this quality improvement project was to share this with the nursing profession so others could utilize these findings in their organization to improve HC nursing knowledge and patient outcomes.

Purpose Statement

This quality improvement initiative aimed to implement a sepsis training program that included sepsis education and a sepsis screening tool for HC nurses and HHC providers. This training program aimed to improve sepsis knowledge among HC nurses, utilize the sepsis screening tool with every HHC patient at every HC visit and identify sepsis earlier to improve patient outcomes and decrease hospital readmissions.

PICO

For HC nurses, what is the effect of early sepsis recognition education and sepsis screening training on the completion of a sepsis screening tool during home care visits and appropriate documentation of sepsis screening outcomes in the electronic health record?

Goals and Objectives

The following are the goals and objectives for this project:

1. To increase HC nursing staff knowledge about sepsis, including the early signs and symptoms, how to use the sepsis screening tool, protocol, and documentation.

    a. Objective: Provide sepsis education and sepsis tool training to all HC nursing staff via live virtual PowerPoint presentation during an All-Nurse meeting where attendance is mandatory. The goal is to have 100% of HC nurses complete the education session module.

    b. Objective: To maximize the potential educational effect, the goal was to have the HC nurses complete the post-education assessment with a score of 85%.

2. To increase HHC provider knowledge about sepsis, including the early signs and symptoms, how to use the sepsis screening tool, protocol, and documentation as sepsis is easy to miss even for nurse practitioners and doctors.

    a. Objective: Provide sepsis education to HHC providers via synchronous virtual PowerPoint presentation during a HHC staff meeting to ensure continuity in sepsis knowledge among both groups.

    b. Provide sepsis education to HHC providers to maximize communication between HC nurses and HHC providers

3. To increase patient awareness of sepsis, and the early signs and symptoms of sepsis

      a. Objective: HC nurses provide sepsis education to HHC patients and family members

         at the start of the home care episode.

4. To implement sepsis screening and documentation at every visit into the home care nurse's

   daily practice.

      a. Objective: Addend the current electronic health record (EHR) used by the HC nurses

         to require completion of sepsis screening and documentation in order to be able to

         identify the signs and symptoms of sepsis earlier.

5. Evaluate the impact of sepsis education on practice.

      a. Objective: 75% of eligible HC staff will complete the educational session on sepsis.

      b. Objective: collect participant perceptions on sepsis screening in HC

6. Documentation of sepsis screenings completed during home care visits with a percent goal

   of 75%.

7. Provision and documentation of completion of patient/family sepsis education by home care

   staff with a goal of 75%.

8. HHC readmission data before and after project implementation will be analyzed to assess

   any possible effectiveness sepsis education, training, screening, and follow-up may have on

   readmission data using a timed series.

Outcomes

The following are the goals and objectives related to outcomes for this project:

1. 75% of randomly selected HC charts will have completed the sepsis screening and

   documentation.

2. Increased knowledge of the participants. The average post-implementation sepsis score will

   be 10% higher than the pre-implementation score.

3.   Hospital readmissions to a large Midwestern healthcare system due to sepsis in HHC

patients between April 20th, 2022, and June 7th, 2022 will be reduced by at least 2 cases.

4.   There is a 75% adherence rate to the new sepsis protocol/initiative

Theoretical Framework

Campbell's Leveraging Resources Model

This project utilized Campbell et al.'s (2015) Leveraging Resources Model. This model

focuses on engaging the community through communication and partnership. In this project, the

community included both the HC nurses, HHC providers, and the HHC patients and families

served.

Three main concepts of this model include "stakeholder engagement, mutual goals, and

shared vision" (Campbell et al., 2015). The healthcare system where this project took place

valued system improvement to improve patient care and outcomes while benefiting the

organization. The stakeholders identified for this project included HC nurses, HHC providers,

HHC program director, HC managers, a Vice President System Clinical Officer (VPSCO), a

Principle Research Scientist, a DNP student advisor, and the project manager (DNP student). The

mission of this group was to work collaboratively with the end goal of HC nursing and HHC

provider sepsis education, sepsis screening tool training, and screening with the intention of early

recognition of sepsis in HHC patients.

Literature Review

Search Process

An initial comprehensive literature search was completed for the PICOT question "For HC

nursing staff, what is the effect of early sepsis recognition education and documentation on the

hospital readmission rate due to sepsis compared to current practice?" (see APPENDIX A).

Databases utilized for this search included the *Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, Cochrane, and Other (Google Scholar)*. Search terms included "sepsis", "sepsis knowledge", "detection", "recognition", "identification", "education", "training", "home health", "home health services", "home care", and "home care nursing". The time frame for the chosen information was extended beyond the five-year window to include 2012 to 2021 due to limited information related to HC and sepsis.

Articles chosen for the critical appraisal were selected based on a relationship between HC nurses and their knowledge of sepsis, sepsis education, sepsis assessment, sepsis documentation, and sepsis treatment.

When the Boolean phrase "and" option was attached to combine terms in PubMed, it generated the most results with eighty-five articles. All eighty-five articles were screened based on reading the abstract, three of which moved on to the critical appraisal phase. These articles included information on sepsis education, detection, treatment, documentation, and HC nursing.

The same search terms used in PubMed were also used in CINAHL and resulted in 4 articles; three of them moved onto the critical appraisal phase. Due to the limited information from PubMed and CINAHL, a Google Scholar search was also utilized using the same search terms listed above, resulting in sixty-eight articles, five of which were chosen and selected for critical appraisal.

A secondary search from the reference list of those articles chosen for the critical appraisal was also used using Google Scholar. This search opened to include in-patient sepsis education, recognition, treatment, and documentation, resulting in fourteen more articles; five were selected for critical appraisal.

Appraisal

Evidence Summary

Appendix A highlights the articles chosen for critical appraisal and incorporates a synopsis of the evidence found within the articles related to the PICO question identified earlier. The evidence table also includes information regarding the type of evidence available, its' worth, the quality of the evidence, the study findings, the sample(s) and settings, and the study's design.

Methodology, Level, and Quality

Of the articles included in the critical appraisals, three were quasi-experimental studies, two were quality improvement initiatives, three were literature reviews, one was an observational study, and one was a clinical update (See APPENDIX B). The critical appraisal utilized the Johns Hopkins Evidence Appraisal Tool by Dang and Dearholt (2017), which enabled the writer to identify the level and quality of the evidence. Of the ten articles critically appraised, five were at a level five, and five were at a level two. The articles' quality was noted to be reasonably even, with three of the articles given a Quality A rating, four at a Quality B, and three at a Quality C rating. Those articles assessed with a Quality C rating were given this level rating due to sample size and not the lack of pertinent information.

Intervention Characteristics

Despite minimal information regarding nursing sepsis education, early recognition, treatment, and documentation in the home care setting, there is a plethora of information regarding sepsis, sepsis education, assessment, treatment, and documentation for the inpatient setting. Information regarding HC, early sepsis recognition, treatment, and documentation had some commonality, similar outcomes, and recommendations regarding the in-patient studies.

Synthesis

Evidence Levels

Half of the articles are rated a level VB, two articles at a level VA and VC, and one article at

a level IIIC and IIB. Those articles with a Quality C rating were given this level rating due to

sample size and not for lack of pertinent information. Due to government regulations regarding

staff education, there were no randomized control studies.

Emerging Themes

Three common themes were identified in the literature regarding early sepsis recognition.

The first commonality among the articles noted that nurses are in a critical position for early

recognition and treatment of sepsis as they are on the front lines of patient care (Drahnak et al.,

2015). The second commonality is that there is a knowledge gap related to what sepsis is, sepsis

risk factors, sepsis identification, sepsis treatment, and documentation which is a critical obstacle

for nurses' to overcome in order to feel comfortable understanding and utilizing practice

guidelines (Coiner & Wingo, 2021). A third and final commonality between HC and in-patient

nurses is that staff sepsis education and use of a sepsis screening tool resulted in earlier

recognition of sepsis resulting in rapid treatment and decreased mortality (O'Shaughnessy et al.,

2017).

Due to the minimal amount of information available regarding sepsis in HHC/HC patients,

eight articles refer to in-patient nursing sepsis knowledge, identification, and treatment. A similar

nursing sepsis knowledge gap is identified in the home care setting. Thus, it is likely that sepsis

knowledge, education, and identification from the in-patient setting could be generalized to the

home care setting.

The evidence reviewed from HC and in-patient sepsis-related studies emphasizes the need for nursing sepsis education as the first step toward improved patient outcomes. Nursing care that includes sepsis screening during every shift (if in-patient) or at every HC visit would allow early recognition of sepsis signs and symptoms, enabling nursing to communicate with providers, start treatment earlier, and prevent/improve sepsis-related mortality. The literature reviewed supported a quality improvement project related to sepsis education to enrich nurses with the knowledge to recognize sepsis's early signs and symptoms, initiate treatment, and document accordingly.

<center>**Evidence to Support Intervention**</center>

Sepsis Knowledge Education

Coiner and Wingo (2021) indicated that a nurse's years of experience and exposure to sepsis were predictors of sepsis knowledge. However, the most potent predictor of sepsis knowledge was having had recent education on the subject matter. For those nurses who may have years of experience but not necessarily exposure to sepsis, the articles by Coiner and Wingo (2021), O'Shaughnessy et al. (2017), Winterbottom (2012), Stamataki et al. (2013), and Yinger et al. (2020) all found sepsis education to be a critical component that is essential to fill the nursing sepsis knowledge gap. Of those nurses who participated in sepsis education, Delaney et al. (2015) and O'Shaughnessy et al. (2017) noted a significant improvement, up to 50%, in nursing sepsis knowledge upon completing a sepsis education post-test.

How nurses learn is just as important as what they learn. Schilinski et al. (2019) noted that nursing knowledge might only be nominally affected when using an electronically delivered learning module (EDLM) to deliver sepsis education versus a live education session when

studying sepsis knowledge among Greek nurses. There needs to be further investigation into knowledge retention based on how nurses are taught. Coiner and Wingo (2021) also suggest that electronic learning may only fill an immediate gap in knowledge.

Sepsis Screening and Outcomes

The literature supported that when nurses are given sepsis education, knowledge improves. With knowledge comes increased comfort, competence (Delaney et al., 2015), and compliance (Drahnak et al., 2016) in sepsis practice policy, identification, screening, and patient care.

There were commonalities among the studies regarding screening and improvement in patient outcomes. A study by Jones et al. (2015) demonstrated an increase in sepsis screening from 10% in year one to 33% by year three. As a result of increased screening, patient deaths related to sepsis decreased to 21.1% after the sepsis screening intervention was implemented compared to a 29.7% death rate before the screening intervention (Jones et al., 2015). O'Shaughnessy et al. (2017) noted that earlier sepsis recognition in two acute care hospitals enabled earlier treatment resulting in decreased patient mortality.

Yinger et al. (2020) determined that there can be a decrease in sepsis hospital readmissions and even prevented altogether if a multidisciplinary home healthcare team utilizes standardized sepsis education and sepsis algorithm on every patient at every visit. This study demonstrated that patients who triggered a positive sepsis screening had an improved likelihood of survival as they were more likely to receive earlier medical intervention(s). Earlier intervention(s) enabled the patient to avoid hospitalization readmission or experience less severe sepsis if transferred to the hospital. The results noted by Yinger et al. (2020) are congruent with the study by Chementi et al. (2020), who looked at screening home care patients for sepsis in New York. Chementi et al.

(2020) noted that of those patients that triggered a positive sepsis screen, 69.2% led to prompt medical treatment, which allowed them to avoid hospitalization due to increased communication between the home health providers and the patient's primary care provider.

Project Implementation

Stakeholders

Key stakeholders in this group were the HC nurses. To improve patient outcomes and awareness regarding early sepsis identification within HHC and HC patients, the HC nurses needed to understand the impact sepsis has on their patient population. They also needed to understand the value of sepsis education and screening to identify sepsis earlier to benefit the patients and the organization. Other key stakeholders were the HC managers who know and understand the potential benefit sepsis screening and early recognition may bring to patients and the organization because of their administrative work. The HC managers could utilize this knowledge to engage, educate, and encourage their HC nurses to see the benefit of sepsis education and screening. A third key stakeholder was the HHC program director, who developed this program to "reduce hospital length of stay, enhance the patient experience, lessen hospital readmissions, and circumvent hospitalization if possible" (Kuhnly, 2020). These goals can be achieved by monitoring patients in their homes virtually (by HHC providers) and in-person (by HC nurses) as well as electronically via biometrics. With the addition of sepsis screening, this program gives patients, HC nurses, and HHC providers another opportunity to recognize sepsis earlier. A fourth and final champion in this stakeholder group includes the VPSCO, who expressed her belief in this project. The VPSCO also expressed gratitude to this DNP student for taking on this challenging work.

This DNP project utilized The Home Care Association of New York State's Adult Screening Tool for Sepsis program (Stop Sepsis at Home NY, 2021). This program, launched in 2017, is the nation's first screening and intervention initiative specifically designed for home care. This program includes an established and validated early sepsis recognition program, screening tool, algorithm, protocol, and patient education tool. Lauren Ford, the Director of Program Research, Development, and Policy with the Home Care Association of New York State and "Stop Sepsis at Home NY" (April 20, 2021), was contacted to discuss how to obtain the license to use their education material and sepsis screening tool. The project manager completed the four-part webinar required before securing the tool, and financial assistance was secured from the VPSCO to purchase the license. The license package consisted of the HCA's sepsis screening tool, the sepsis protocol, the sepsis screening algorithm, the patient education zone tool, patient education tools and resources, comprehensive training materials for clinical and non-clinical staff (a PowerPoint™ presentation, sepsis case scenarios with hands-on training exercises, and ongoing support from staff at the Home Care Association of New York State (HCA).

The baseline presentation included a fifty-two-page HCA PowerPoint ™ presentation. Of the fifty-two slides, thirty-one were used, eleven were adapted to include updated information and statistics, and twenty-three new slides were created. New slides included information and statistics related to this DNP project, information discussing a normal immune response, and a diagram of sepsis pathophysiology.

After the purchase of the license and the tool was secured, one of the HC managers independently collaborated with electronic health record (EHR) staff to amend the current assessment and documentation template used by HC nursing to include the new sepsis screening tool and documentation protocol.

After work on the EHR was completed, educational opportunities were made available for

the project manager to present the sepsis education and sepsis screening tool to the HC nursing

staff on two separate dates. The HC managers scheduled these dates as part of their quarterly

All-Nurse meeting. Five days before the first HC nursing staff meeting, one of the HC nurse

managers disseminated the HHC Sepsis Screening Project email to the HC nursing staff. This

email introduced the project, and participants were informed that (1) completing the survey was

voluntary, (2) that the status of their participation or results would not be known to their

supervisor, and 3) their participation would not impact their performance appraisal, (4) that they

can discontinue participation at any time, (5) that by submitting the completed survey they were

giving consent to participate. Participants were given the DNP project manager's name and

contact information for any questions they may have had regarding the project or survey(s).

In order to allow for comparison of survey results over time and among respondents,

participants were instructed to create a unique identifier that included the first initial of their

mother's first name and maiden name followed by the participants' four-digit year of birth (i.e.,

LS1956). This information would allow access to REDcap, which housed all the surveys.

HC staff was asked to complete a participant data survey and pre-sepsis education

knowledge assessment before the start of the 4/19/22 and 4/28/22 All-HC Nurse meetings. HC

nurses were then asked to complete a post-sepsis education knowledge assessment, which was

identical to the pre-sepsis education knowledge assessment (see APPENDIX C1 and C2). The

goal was to have 50% of HC nurses complete the surveys.

The modality through which the education was taught was given significant consideration as

it is not only important to consider what nurses learn and but also how to best learn to optimize

retention. Two modalities were up for consideration; an electronically delivered learning module (EDLM) which would utilize a pre-recorded, voiceover PowerPoint ™ presentation, or a virtual PowerPoint™ presentation. Each modality has its advantages and disadvantages. Using an EDLM gives staff the flexibility to take the course when it is convenient for them within a mandatory timeline; however, a study of Greek nurses by Schilinski et al. (2019) noted that there was only a nominal influence on knowledge when education was received through an EDLM. Based on the nominal influence on knowledge attained by an EDLM, a literature review (Schilinski, Hellier, and Cline, 2019) stated that live, in-person training optimizes the nurse's time and ensures learned material will increase knowledge and retention for nursing practice. HC manager feedback stated that participation would be higher if the presentation were live, and the virtual PowerPoint ™ modality was chosen. Each education session took approximately forty-five minutes to present. The sample size for the HC group was 114, and the goal was to have 75% of the HC nurses complete the education by the set due dates.

The original project plan was to have HC nursing staff screen every HHC patient at every visit; however, this did not occur. An unforeseen conflict occurred after HC leadership gained access to The Home Care Association's Adult Screening Tool for Sepsis. A pop-up banner was created in the EHR by information technology staff at AllinaHealth. This pop-up banner alerted a HC nurse to do a sepsis screen based on a computer-generated algorithm utilizing lab and vital sign data. Three criteria had to be true for the banner to appear, and information could have appeared anytime within the last seven days. Information included temperature (>100.9 or <96.8), pulse (>90), respirations (>20), white blood count (>12 or <4), partial thromboplastin time >60, systolic blood pressure (<90), platelet <100, mean arterial pressure <65. The decision

was made by HC leadership for HC nurses to complete a sepsis screen only for those patients

identified by the EHR.

The decision to use a computer-generated algorithm as a trigger to screen patients

significantly affected this project's purpose, which was to screen all HHC patients at every HC

visit. This decision led the project manager (DNP student) to ask for volunteers to screen HHC

patients at every visit for three weeks manually. Screening every HHC patient at every HC visit

by a few volunteer HC nurses would allow the project manager to compare computer-triggered

sepsis screens with the volunteer screenings to assess the impact on their workflow,

effectiveness, and feasibility. Perception of impact was determined by a 6-question Post-Sepsis

Screening in HHC Patients Volunteer Assessment (see APPENDIX D).

A QR code was placed at the end of the presentation so participants could use their

smartphones to sign-up as volunteers for the manual screening of every patient. Due to the low

participation rate from the April 19th presentation, the QR Code was put at the beginning of the

presentation for the April 28th education session. Additionally, to entice participants from HC to

volunteer, a twenty-dollar Target or Speedway card was added to the project. Despite the added

incentive, there initially were no volunteers after either presentation. The lack of volunteers led

the project manager to hand-pick HC nurses based on names given to her by one of the HHC

providers. Fifteen HC nurses were emailed asking if they would consider volunteering for the

project (See APPENDIX E).

Alignment

The VPSCO was grateful for this project and believed this project aligned with the organization's strategies. The organization's top performance measures within the Quality and Safety pillars were readmissions, inpatient mortality, and the utilization of resources leading to inpatient admissions. The VPSCO specifically mentioned sepsis as a leading diagnosis responsible for readmissions, patient mortality in the hospital, and inpatient admission utilization. Contending with and finessing processes of identifying sepsis early, implementing treatment strategies, and caring for sepsis patients is crucial to enable this organization to move positively toward system objective targets within the quality and population health strategies. Not only did this project align with the Safety and Quality pillars strategy of this organization, but it also aligned with its strategy toward equity in the community it serves. This is done by helping the community reach its full capacity by procuring the connections needed to participate in opportunities that allow and encourage self-actualization (through home care). By uncovering and understanding the unique needs of our population (high risk for sepsis and lack of sepsis knowledge in HC patients participating in HHC), the health system can generate solutions that promote health and healing by closing gaps in provider knowledge (HC nurse sepsis education).

Population

This quality improvement project was conducted among HC nursing staff within a large Midwestern Metropolitan healthcare organization, serving as the inclusion criteria. There were no specific exclusion criteria. For the sepsis education component of the project, there were 114 HC nurses educated; 6 men (5.2%), 102 women (89.4%), and six unidentified (5.2%) participants. Of the 114, 15 (13.1%) participated in the Participant Data survey.

HC practice among the RNs ranged from less than five years (40%) to over 20 years (6.6%). Years of employment with the organization ranged from less than one year (13.3%) to more than ten years (26.6%). Of the respondents, 2 (13.3%) reported they had less than one year of HC of practice, 3 (20%) had from 1 to less than three years of HC practice, 2 (13.3%) had from 3 years to less than five years of HC practice, 2 (13.3%) from 5 years to less than seven years of practice, 2 (13.3%) from 7 years to less than ten years of HC practice, and 4 (26.6%) had more than ten years of HC practice.

Interestingly, 80% of respondents reported having experienced caring for a HC patient who developed signs and symptoms of sepsis, and 100% of respondents had cared for HC patients recovering from sepsis.

Figure 1

Level of Confidence Assessing Patients for Sepsis
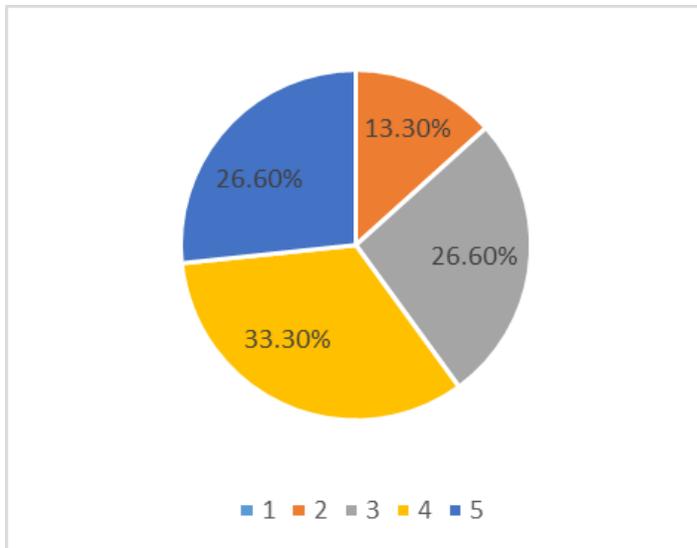
Note: n=15; 1=Low, 5=High

Figure 1 above shows the HC nurse's confidence level in assessing patients for early sepsis before education and sepsis screening tool training on a scale of 1 to 5 (one = poor, 5 =

excellent). The majority (33.3%) rated themselves at a "4" or had a moderate confidence level in assessing for the early signs and symptoms of sepsis prior to the sepsis education.

Figure 2

Current Knowledge of the Early Signs of Sepsis
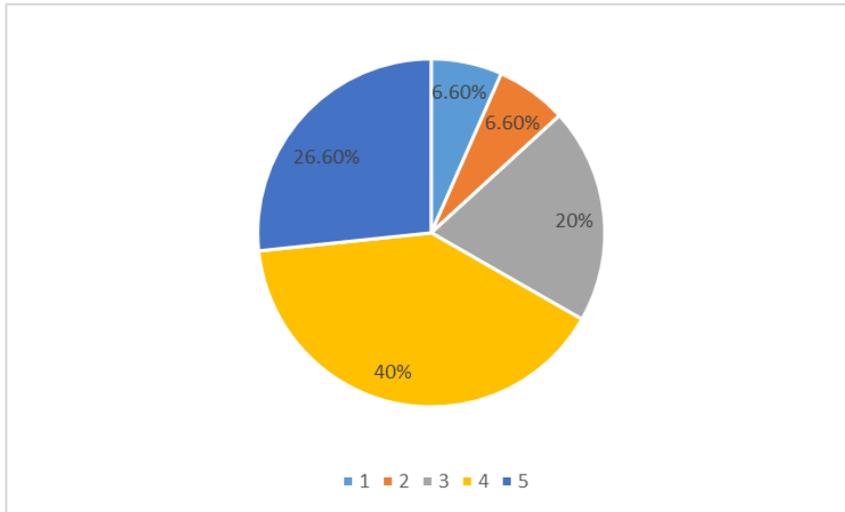
Note: n=15; 1=Low, 5=High

Using the same 1 to 5 scale and as shown in Figure 2 above, HC nurses were asked to rate their current knowledge regarding the early signs of sepsis prior to the sepsis education. The majority (40%) rated themselves at a "4" or having a moderate amount of knowledge regarding sepsis.

Due to a known gap in sepsis knowledge among HC nurses, the HC nurses were asked whether they had received any sepsis education in their current position. 53.3% of the respondents reported previous sepsis education. Of those with previous sepsis education, 54.5% completed a formal course, 27.2% learned through self-directed study, and the remainder did not specify a delivery method.

Finally, using the same 1 to 5 scale, and as shown below in Figure 3, HC nurses were asked how important they thought an education program on assessing home care patients for early

signs and symptoms of sepsis was. The majority (93.3%) rated this as a "4" or "5" or as of

"moderately-high to high" importance.

Figure 3

Importance of an education program on assessing home care patients for early signs and symptoms of sepsis
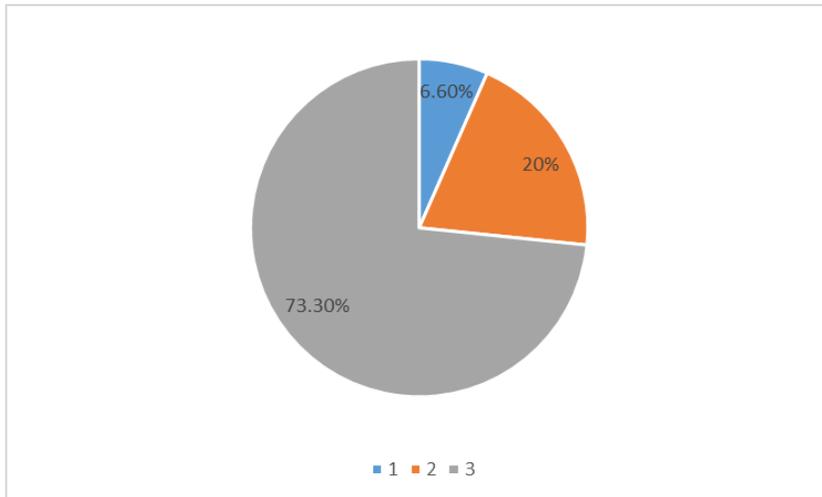
Note: n=15; 1=Low, 5=High

A decision by HC leadership prompted the release and usage of the sepsis screening tool

prior to the sepsis education. When asked how many participants started using the sepsis

screening tool before the education session, 60% said they had not used it, and 40% said the

question did not apply to them. When asked how many were given training on how to use the

sepsis screening tool prior to using it, 13.3% replied "Yes," 20% replied "No," and 66.6% replied

that this was "Not applicable" to them. When participants were asked whether they were

comfortable using the sepsis screening tool, nobody replied "Yes," 6.6% replied "No," and

93.3% replied "Not Applicable" to them. Finally, when asked if they knew what to do for a

positive sepsis screen, 6.6% replied "Yes," and 93.3% replied that this was "Not Applicable" to

them.

Data Collection

Participant data were collected from REDcap, a HIPAA-compliant data collection tool, and Google Forms. There was poor participation in the project, partly due to significant technological difficulties with REDcap that were out of the project manager's control. Several participants contacted the project manager, stating that the survey link would not open. The REDcap administrator acknowledged a known problem: some links were not working due to a software upgrade. The REDcap administrator suggested that participants continue to try the link as often the problem with the link was resolved after waiting and returning later. Even though participants were made aware of the technical issues and asked to continue to re-try the link, understandably, the response rate for post-education completion was poor.

Fifteen participants completed the Participant Data survey. Nine participants could answer using the REDcap system, and six used Google Forms for the Participant Date Survey. Three participants used REDcap, and zero used Google Forms for the Pre-Sepsis Education Knowledge Assessment. There was 1 participant who used REDcap and zero participants who used Google Forms for the Post- Sepsis Education Knowledge Assessment. Due to the access problem with REDcap, the only tool used to collect data at five weeks was the Homecare Staff Sepsis Knowledge Retention Assessment and Staff Perceptions of Sepsis Education Module Google Form, for which there were 5 participants (See APPENDIX F).

To increase sepsis awareness among patients and family members, the HC nurse also had access to and opportunity to provide sepsis education using the HCA Early Signs and Symptoms of Sepsis Patient Education Zone Tool. As the title states, the tool included the signs and symptoms of sepsis and the risk factors that put the patient at higher risk for sepsis. The goal for compliance with providing and documenting sepsis education, including risk factors, to patients

and family members was also 85% for HC nurses. Ongoing surveillance of staff documentation

of patient education also took place through chart audits with assistance from the HC/HHC data

analyst.

Ethical Considerations

    a.   Prior to the implementation of this quality improvement project, an application was

        submitted to and reviewed by the Co-Chair of the Institutional Review Board (IRB) at

        St. Catherine University (SCU) and given exemption from IRB review on September 1,

        2022 (see APPENDIX G). An application was also submitted to the IRB at the health

        system where the project took place. On November 9, 2021, this project was approved

        for quality improvement.

    b.   Objective: Addend the current electronic health record (EHR) used by the HC nurses to

        require completion of sepsis screening and documentation in order to be able to identify

        the signs and symptoms of sepsis earlier.

Social Justice Considerations

An article dating back to 2005 by Kane and Kane (2005) noted that "because older adults

are disproportionately heavy users of medical care—since they typically bear a greater burden of

illness—there are systematic efforts to limit their use of services." This statement indicates a

population prioritization conflict regarding older adults.

Minnesota was not exempt from older adult health prioritization challenges and conflicts.

Compared to all U.S. states, Minnesota was ranked as "strong" in categories such as "access to

care," "diseases and conditions," "health insurance," and "type of care" (acute versus chronic

versus prevention), however, fell short in two particular and vital categories. As recently as

2017-2018, Minnesota was rated in the "very weak" category when it came to "older adults as a

priority population" per the National Healthcare Quality and Disparities Report (Agency for Healthcare Research and Quality, n.d.). As a priority population in Minnesota, older adults rank behind women, children, Whites, Blacks, Asians, American Indian/Alaska Natives, and Non-Hispanic Whites. During these same years, Minnesota was also rated on the low side of the "weak" category when it came to "Home Health-Hospice settings of care" (included issues such as HC provider and patient discussions regarding how to set up home for safety, prescription medication and over-the-counter medications upon start of HC episode, or just informing the patient about what services he/she would be getting) (Agency for Healthcare Research and Quality, n.d.). As stated earlier, population health prioritization has not just been an issue for Minnesota but the United States as a whole, likely due to a rise in an aging population. 80% of those 65 and older have a minimum of one chronic disease, and 70% of Medicare beneficiaries with two or more chronic diseases (National Council on Aging, 2021) due to advanced technologies that help people live longer. This longevity and multiple chronic diseases put older adults at risk for health disparities and conditions such as sepsis.

Since the rise in awareness regarding sepsis, there has been work done, like that of Jones et al. (2015), to correct the institutional etiologies of sepsis in in-patients; however, the focus on sepsis prevention and early treatment has to include home care patients. One way to correct this social injustice towards home care patients is to educate HC nurses on identifying, assessing, treating, and documenting sepsis earlier. A second way to correct this social injustice is to have HC nurses raise awareness and educate their patients and families about sepsis risk factors and early signs and symptoms.

In this project, social justice was at the forefront with its desire to provide the same opportunity for all HHC patients to attain or maintain their health regardless of their literacy,

health literacy, health status, or language. Inclusion could be achieved by utilizing or leveraging

the HC nurses by educating them to identify early signs and symptoms of sepsis through

screening. Upon completion of the sepsis education, the HC nurse can then educate the patient

and family about sepsis upon the start of the home care episode. Inclusivity could be provided by

utilizing appropriate resources such as interpreter services or other pieces of sepsis-related

materials in non-English languages.

Ensuring that HC nurses perform this screening on every HHC patient at every HC visit

would assure inclusivity and that no one would be left out.

Evaluation

Analysis Methods

This quality improvement project used a purposeful sample of HC nurses and descriptive

statistics.

Presentation of results

Of the 15 participants who completed the Participant Data Survey, only three completed the

Pre- Sepsis Education Knowledge Assessment, one completed the Post-Sepsis Education

Knowledge Assessment survey, and the 5-week Sepsis Knowledge Retention and Education

Perception of Homecare Staff survey. Four more participants also completed the 5-week Post-

Sepsis Education Knowledge Assessment survey. The lone participant who completed all three

surveys showed a lower score (10 versus 11 out of 16) on the post-sepsis education knowledge

assessment, a decrease in score by 6.2%. Not all was lost, though, in sepsis education. The same

participant's score on the 5-week Sepsis Knowledge Retention and Education Perception of

Homecare Staff survey was higher (15 versus 11 and 10 out of 16), by 25% when compared to

the Pre- Sepsis Education Knowledge Assessment survey and 31.2% when compared to the Post-

Sepsis Education Knowledge Assessment survey.

Data collected from the Pre- Sepsis Education Knowledge Assessment came from 3

participants. The three participants scored 100% accuracy on questions 2, 6, 9, 13, 14, and 15 (6

out of 16 questions for a total of 37.5% accuracy overall) (see APPENDIX C2). The three

participants answered incorrectly on questions 1, 4, and 12 (3 out 16 questions or 18.7% of the

time). For questions 3 and 5, only one of the participants (33.3%) answered correctly, and for

questions 7, 8, 10, and 11, two participants answered correctly (66.6%).

For the project's sepsis screening component, 8 HC nurses initially volunteered, two of

whom had to de-enroll from the project due to unforeseen medical issues. Of the six volunteers,

there were eight patients screened. There were six negative screenings and two positive

screenings. There was no follow-up to the two positive screenings as there was no way for the

project manager to track these patients without breaching patient confidentiality.

The project finished with a Post-Sepsis in HHC Patients Volunteer Assessment. Most

volunteers (n=5) found it moderately easy to incorporate the sepsis screening into their

workflow, and all respondents found the sepsis screening tool easy to use. All respondents

recommended screening for sepsis for every HHC patient at every visit, whereas only 80%

would recommend screening all HC patients at every visit. All respondents found the items in the

sepsis screening tool to be clear and concise. All respondents see completing the sepsis screening

tool as valuable to increasing patient safety.

Interpretation of Results

There was excellent participation in the sepsis education; presumably, HC nurses will have

increased awareness of sepsis and be better at identifying signs and symptoms of possible early

sepsis. Due to the small sample size, it is not possible to correlate whether the sepsis education

given in this project was responsible for the significantly increased score on the Homecare Staff

Sepsis Knowledge Retention Assessment completed five weeks after the sepsis education session

was given.

Due to the small sample size and the decision to utilize a computer-generated algorithm that

only screened some HHC patients, the goals and objectives set out for this project were not

achieved.

Due to information technology's inability to capture and measure the amount of computer-

triggered screens, it was not possible to compare data between the auto-generated screens and the

screens done by volunteers.

Limitations

With a new directive by HC managers to only screen computer-generated at-risk patients,

sepsis screening at every visit was not done. Due to the small number of HC nurse volunteers to

manually screen every patient, there was inadequate data collected to correlate findings between

screening every patient every time and a possible decrease in hospital readmission rates. Another

limiting factor was that HC staff were not mandated to take the pre-and-post-test, and likely due

to this and technology issues, only one participant took the post-test.

<div align="center">

Discussion

</div>

Recommendations

Several recommendations could make any future projects like this more successful.

Stakeholder buy-in is essential for any QI project. Initially, there was buy-in from HC leadership;

however, once the NY Adult Sepsis Screening Tool was available, an alternative screening plan

for patients who triggered the sepsis banner based on a pre-loaded algorithm vs. every patient was implemented. Improved communication with HC managers might have identified this new initiative earlier and provided time to make changes. The project was based on the successful work done on early identification of sepsis in HC by the HCA of New York State, where sepsis screening was completed on every patient. It is unknown how effective screening a computer-generated selection of patients will be at identifying all early sepsis cases. By using a computer versus humans, the ability to prevent sepsis may be less as only a subset of patients will be screened, potentially leaving many HHC/HC patients more vulnerable to sepsis. Ideally, a research project that compares computer-generated HC patients for sepsis screening to screening all HC patients should be undertaken to determine reliability and efficacy.

The goal of this project was to screen to prevent sepsis, not screen to find sepsis.

There are a few recommendations to help increase participation in future projects. Technology, when functioning correctly, is a significant benefit for teaching, learning, and assessing. Unfortunately, REDcap had just undergone updates that made employee access difficult, resulting in fewer completed employee training assessments. It is essential to work closely with IT personnel and test the process with volunteers to ensure the platform performs correctly.

A third recommendation to help increase participation included having the HC manager send out the Participant Data/Pre-and-Post Sepsis Education Knowledge Assessment five days prior to any subsequent meetings. In the current project, the HC manager only sent out the above surveys once, five days before the 4/19/22 meeting but 14 days before the 4/28/22 meeting. There was a reminder from an HC manager on 4/25/22 for staff to take the surveys before the

4/28/22 meeting; however, staff may have deleted the email since it did not directly impact them the day it was initially sent.

A fourth recommendation includes putting the QR code at the beginning of the presentation so that participants have time during the presentation to consider whether they would like to participate. Other topics were covered during the nursing staff meeting following this presentation. Having the QR code at the end of the presentation does not provide enough time for staff to think about participating and fill out the QR code.

A fifth recommendation would be to see if hospital readmission rates could be reduced by utilizing the screening tool on every patient at every time. A future initiative/research project to evaluate the number of positive screens and subsequent interventions against sepsis admissions might help answer this question.

Finally, if screening every patient every time, a sixth recommendation is for improving communication between the project manager and the volunteers to track sepsis screen results. The process of a verbal report was cumbersome, not feasible, and time consuming.

Implications for Nursing Practice and Nursing Knowledge Development

HC nurses are in a unique position and play a critical role in being able to help identify those patients at risk of sepsis. Increasing HC nursing's knowledge about early signs and symptoms of sepsis and incorporating an easy-to-use, evidence-based sepsis screening tool into HC practice can save lives. Identifying the sepsis knowledge gap among home care nurses was the first step toward improving the quality and safety of nursing care and nursing practice.

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Appendix A

Literature Review Diagram

Identification

Records identified through databases
2012-2021
PubMed n=108
CINAHL n=14
Cochrane n=11

Additional Records Identified through other Sources
Reference n=15

Records after duplicates removed
n=152
Citations screened

Exclusion Criteria
Sepsis Prevention

Screening

Records Screened
n=148
Abstract/Introduction review
for relevance

Inclusion Criteria
Articles pertaining to:
Sepsis
Community-acquired sepsis
Nurses' sepsis knowledge
Sepsis detection
Sepsis recognition
Sepsis identification
Sepsis education
Sepsis training
Sepsis screening
Home Health
Home health services
Home care
Home care nursing
          n= 148

Eligibility

Full articles assessed for eligibility
n=22
Critical appraisal for leveling and
quality

Included

Eligible articles included after appraisal
n= 10
Quasi-experimental n= 3
Quality Improvement n= 2
Literature Review n= 3
Observational n=1
Clinical update n = 1

Appendix B

Evidence Table

Citation: author/date of publication & title	Purpose of study	Conceptual framework	Design/ Method	Sample/ Setting	Major variables and their definitions	Measurement of major variables	Data Analysis	Study Findings	Worth to Practice: LOE/quality/ feasibility/ conclusion/ recommendation
Chimenti, C., Sears, G., McIntyre, J. (2020) Screening, Education, and Rapid Triage	To investigate the influence(s) of a quality improvement and a change in process initiative on patient outcome(s).	New York State Home Care Association (HCA) sepsis-screening tool	Quality Improvement Retrospective chart review/ purposive sampling	n=105 registered nurses; 11 licensed practical nurses/ HCR Home Care agency	Home care clinical staff, outside providers/ physicians, EMS partnership ED coordination Patient/ caretaker Sepsis education	New York State Home Care Association (HCA) sepsis-screening tool	Minitab Statistical Software of 33,264 sepsis screens	Of the sepsis screenings that were positive, 69.2% of them culminated in prompt medical treatment enabling them to avoid hospitalization due to increased communication between home health providers and patient's primary care provider.	Level V High quality Feasible if organization wants to spend $1500 for screening tool access Would use if financial resources available

Coiner, S., Wingo, N. (2021) Addressing Gaps in Nurses' Knowledge of Sepsis: A Literature Review	To investigate the current methods of sepsis education and how this is closing the knowledge gap regarding sepsis.	N/A	Literature Review/ Used PubMed and CINAHL with Boolean strings	n=9 articles at levels II and III	Current knowledge state Predictors of sepsis knowledge Methods of sepsis education	Pre and post-tests Integrating simulation into education	Not specified	Years of experience and sepsis exposure is a predictor of knowledge; having education focused on sepsis in the recent past was the most potent predictor of knowledge; electronic learning may only fill immediate gap in knowledge and not contribute to retention	Level II Good quality Feasible to repeat inexpensively at a local level
Delaney, M., Friedman, M., Dolansky, M., Fitzpatrick, J. (2015) Impact of a Sepsis Educational Program on Nurse Competence	To investigate the significance or meaning of a multimodal program geared toward sepsis to assess knowledge attainment and competence based on self-assessment in recognizing and treating patients with sepsis for nurses working in both critical care and the emergency department.	N/A	Quantitative, Quasi-experimental 3 research questions	n=82 critical and emergency department nurses in a 1-year training program for critical care nurses (purposive sampling) in a large northeastern health care system in the United States	Critical care nurses Sepsis knowledge	Taming Sepsis Educational Program (TSEP™) Nurse Competence Scale (NCS)	One-tailed paired t-test for the pre and post-test for question 1. Pre-NCS and post-NCS scores utilized a paired t-test for question 2. To test for correlation among the four modular post-test scores, a spearman correlation analysis was used.	There was no advancement in the scores from the self-assessment of competence scores however the perception in how often the competency behaviors advanced. There was an increase in competence perception in three sepsis-focused statements. There was also significant advancement in knowledge upon	Level II Good Quality Limited by purposive sampling and self-assessment which limits the generalizability of the study outcomes.

								post-test knowledge assessment.	
Drahnak, D., Hravnak, M., Ren, D, et al. (2016) Scripting Nurse Communication to Improve Sepsis Care	Increase sepsis care by utilizing the Surviving Sepsis Campaign (SSC) guidelines and Institute for Healthcare Improvement bundles, incorporating an education intervention focused on nurses, and adopting a sepsis screening and	Six Sigma: Define, Measure, Analyze, Improve, and Control model. Surviving Sepsis Campaign Guidelines. Institute for Healthcare Improvement	Literature review/ Method: Pre-post survey, chart audit	n=681 nurses from a level 1 trauma hospital	Nursing education: consisted of a 30-minute voice-over slide presentation with patho-physiology, sepsis assessment, risk factors, bundles from SSC, how to document, and	Survey prior to and after intervention; simulation at the end of the session to help develop comfort level among the nurses when notifying a provider and utilizing the sepsis tool within the electronic medical record.	Wilcoxon Signed-Rank Test utilized for Likert scale. McNemar's test for paired data used for pre and post survey Chart audit to monitor documentatio n compliance of post-education nursing sepsis screening.	The Situation-Back-ground-Assessment-Recommendation method was a practical tool to communicate acute conversation needs. Increased consistency in using the documentation tool screening via the electronic health record when there was education and supportive nursing practice	Level II Good quality Limited to one facility and all one type of nurses (acute care). Not able to ascertain knowledge retention as measuring post-intervention compliance was immediate.

	documentation tool within an electronic health record.				conclusions. Used McKesson Horizon Expert Documentation ™ Sepsis Screening Tool			policy in place. Early recognition of sepsis occurred by utilizing the Systemic Inflammatory Response Syndrome Criteria	
Jones, S., Ashton, C., Kiehne, L., et al. (2015) Reductions in Sepsis Mortality and Costs After Design and Implementation of a Nurse-Based Early Recognition and Response Program	To investigate whether implementing a four-part sepsis intervention, including nurse sepsis education, would have an impact on mortality and cost.	Surviving Sepsis Campaign Acute Physiology and Chronic Health Evaluation (APACHE) II system	Observational Method: Nurses used sepsis screening tool to screen patients twice daily	No nursing sample size available Houston Methodist (HMH) Hospital in-patients (56,190 patient screens from 2009 to 2011)	Nursing education: courses discuss sepsis epidemiology, signs and symptoms, and burden of sepsis. Second responder training encompasses a four hour simulation class utilizing scenarios Sepsis criteria: defined as a score of >4 to qualify for second provider assessment	Sepsis tool developed by HMH acute care surgeons	Comparison of inpatient death rate prior to and during the intervention phase using a two-sample test. Stat 13 and Change-Point Analyzer 2.3 used for analysis.	There was an increase in patient sepsis screening from 10% in year 1 of the study to 33% in year 3 of the study. There was a decrease in inpatient deaths related to sepsis to 21.1% after intervention down from 29% prior to intervention. A decrease in hospital costs for Medicare beneficiaries compared to pre-intervention time.	Level 2 High quality
O'Shaughnessy, J., Grzelak, M., Dontasova, A., Braun-Alfano, I. (2017) Early Sepsis Identification	To promote early identification of sepsis signs and symptoms via staff nurse sepsis education and screening tool	Knowledge to Action (TKA) by White & Dudley-Brown (2012).	Quasi-experimental/ Method: surveys and retrospective chart review	n=34 nurses at Hospital 1 -a 52-bed medical-surgical floor of a Level II trauma	Medical-surgical nurses sepsis knowledge and notification of provider or rapid response team. Hospital	15-question survey of nurses regarding sepsis knowledge, manifestation, and advancement.	Pre and post intervention survey to ascertain knowledge difference. Pre and post intervention time to	Improvement in sepsis related information in nurses by 50% demonstrated by post-survey scores. Notification time improved	Level 2 Low quality due to sample size Good starting point for further studies.

usage who work on a medical-surgical unit within two acute care hospitals.				center and teaching hospital 17 nurses at Hospital 2 - 38-bed medical-surgical floor of a Catholic teaching hospital	1 received electronic medical record notice and screened further using paper tool. Hospital 2 patients were screened a minimum of once a shift, using paper tool, by nurses.	Retrospective chart review for one month prior to project start to determine length of time for provider/rapid response team notification.	provider/rapid response notification.	Education of staff regarding sepsis and using a screening tool for sepsis resulted in earlier recognition of sepsis which enabled rapid treatment resulting in decreased mortality.	
Schilinski, S., Hellier, S., Cline, T. (2019) Evaluation of an Electronically Delivered Learning Module (EDLM) Intended for Continuing Education of Practicing Registered Nurses: A Pretest-Posttest Longitudinal Study	To investigate whether there was knowledge attainment and retention of a new protocol for sepsis and to ascertain study participants' beliefs and habits surrounding EDLM education.	N/A	Longitudinal Quasi-experimental Method: survey	n=24 nurses	Nurses Sepsis knowledge gained from EDLM	Surveys assessing demographic information, pretest, intervention, posttest, 4-week follow-up knowledge assessment	Paper surveys were manually entered into the IBM SPSS version 25 data analytic software.	There may be nominal continued influence on nursing knowledge when using EDLM's for didactic education information. The design of the module and assessment may contribute to knowledge recollection. This study is congruent with previous studies.	Level II Low Quality due to sample size, lack of generalizability, no control group, facility's education department developed both the assessment and intervention resulting in no validity or reliability of assessment tool.

Smith, E., Rice, K., Winterbottom, F. (2012) Nurses' Critical Role in Identifying Sepsis and Implementing Early Goal-Directed Therapy		The Global Sepsis Alliance Surviving Sepsis Campaign	Clinical Update	N/A	Sepsis recognition Early treatment	SIRS criteria Start treatment within hours of diagnosis	Not discussed	If treatment is in place early, outcomes include decrease in mortality, compliance with protocol increases, and staff education is critical to get started	Level V Good quality Reinforces need for sepsis education Feasible Recommended
Stamataki, P., Papzafiropoulo u, A., Kalaitzi, S., et al. (2013) Knowledge regarding assessment of sepsis among Greek nurses	To investigate whether Greek hospital nurses had proficiency in sepsis evaluation and oversight in order to care for patients.	Guided by the 2004 amendment of the Declaration of Helsinki; guidance from Good Epidemiological Practice and the provincial regulator requirements (IEA, 2007).	Literature review/ Mixed methods: Qualitative - interviews Quantitative - closed section	n=835 tertiary hospital nurses who have worked at least one year.	Interview setting Tertiary hospital nurses- sepsis evaluation and oversight capabilities	Questionnaire developed by three expert nurses and three expert physicians who were on the Helsinkin Sepsis Study Group steering committee	Divided into two groups for analysis: education level (four year versus two year) and ICU versus non-ICU setting. A chi square test was applied between groups; SPSS statistical tool used	Greek nurses sepsis knowledge and management is only at a satisfactory level. Future education should focus on sepsis awareness and assessment knowledge. Nurses play a vital part in the early recognition and treatment of patients with sepsis which is integral for their survival.	Level V Low due to lack of questionnaire validation, use of true or false questions

Yinger, K., Bernas-Maley, M., Bhatia, V. (2020) Utilization of a Visit-Based Sepsis Assessment to Prevent Hospital Readmissions.	To determine if sepsis assessments during home care visits prevented sepsis hospital readmissions in home health care patients and increased the chance of survival.	Sepsis Alliance and Home Care Associate of New York	Quality Improvement	n=240 clinical staff including nurses as part of WellSpan Visiting Nurses Association	Sepsis care plan Sepsis screening done and documented with every visit. Completion of and documentation of vital signs at every visit.	STOP and WATCH tool, sepsis screening	Chart audits	Hospital readmissions due to sepsis can be decreased and prevented with a multidisciplinary home healthcare team that utilizes standard sepsis education and sepsis algorithm on every patient at every visit. There was improvement in the likelihood of survival if patients who triggered a positive sepsis screening, received earlier medical intervention(s) which enabled the patient to avoid hospital readmission, or less severe sepsis if transferred to hospital.	Level V Good

Appendix C51

Participant Surveys

Appendix C1

Participant Data Survey

1. What is your current position in homecare?
    a. Nursing   d. Social Work   g. Home Health Aid
    b. Physical Therapist   e. Occupational Therapist
    c. Occupational Therapist   f. SLP

2. How many years of experience do you have practicing home care?
    a. <5 years
    b. 5 - <10 years
    c. 10 - <15 years
    d. 15 - <20 years
    e. >20 years

3. How many years have you been employed at AH Home Care?
    a. < 1 year
    b. From 1 to less than 3 years
    c. From 3 years to less than 5 years
    d. From 5 years to less than7 years
    e. From 7 years to less than10 years
    f. More than 10

4. Have you taken care of a home care patient who developed signs and symptoms of sepsis at home?
    a. Yes
    b. No
    c. Don't recall
    d. I think so but am not sure

5. Have you taken care of a home care patient recovering from sepsis?
    a. Yes
    b. No
    c. I think so but am not sure
    d. I don't recall.

6. On a scale of 1 to 5, (one being lowest, 5 being highest), how would you rate your current level of confidence in assessing patients for early sepsis?
    a. 1
    b. 2
    c. 3

      d.   4

      e.   5

7. On a scale of 1 to 5 (one being lowest, 5 being highest) how would you rate your
   current knowledge of the early signs of sepsis?

       a.   1

       b.   2

       c.   3

       d.   4

       e.   5

8. Have you received any sepsis education in your current position?

       a.   Yes

       b.   No

       c.   I think so but am not sure.

       d.   I don't recall.

9. If your answer was yes to the previous question, how was the education delivered?

       a.   A clinical course (i.e., e-learning module)

       b.   Printed handout on sepsis

       c.   Self-directed study

       d.   Other (please describe)_____

10. On a scale of 1 to 5 (1 being lowest, 5 being highest), how important would an
    education program on assessing home care patients for early signs and symptoms of
    sepsis be to you?

        a.   1

        b.   2

        c.   3

        d.   4

        e.   5

(Gronseth, 2021a)

Appendix C2

Pre and Post-Sepsis Education Knowledge Assessment

1) Which is NOT a Systemic Inflammatory Response Syndrome (SIRS) criteria?
   a) Hyperthermia >38.7° C
   b) Hypothermia <36°C
   c) Tachycardia >90 bmp
   d) Tachypnea >24 breaths/minute
   e. WBC count >12,000µL or <4,000µL
   f. Normal WBC with >10% bands
   g. Hyperglycemia <140 mg/dL

2) The two most common sites of infections among adults with sepsis are _____ and _____.
   a) Lung, Urinary Tract
   b) Airway, Gut
   c) Abdominal, Skin/soft tissue
   d) Urinary, Intestinal

3) The all-cause mortality rate for the patient who develops sepsis in the acute care setting is:
   a) 20% (one in 5)
   b) 50% (one in 2)
   c) 75% (3 out of 4)
   d) 80% (4 out of 5)

4) According to Buchman et al. (2020), the all-cause mortality rates for United States Medicare beneficiaries who survived sepsis following hospital admission is:
   a) 45% in two years
   b) 60% in three years
   c) 75% in three years
   d) 65% in five years
   e) 75% in five years

5) Which of the following statements is correct?
   a) Severe sepsis is the failure to respond to IV fluid resuscitation (i.e., perfusion) attempt
   b) Severe sepsis always follows sepsis
   c) Organ dysfunction is associated with severe sepsis.
   d) Sepsis can be classified as sepsis and severe sepsis.
   e) Severe sepsis and sepsis is distinguished by ability to respond to fluids.

6) Which of the following conditions increase an individual's risk for infection and sepsis. (select all that apply)

    a.   Patient actively receiving chemotherapy
    b.   Patient with a central or peripheral intravenous line
    c.   Patient with RA on chronic steroid use
    d.   Patient with liver cancer.
    e.   Asplenia
    f.   Patient with a dehisced abdominal incision

7) Which of the following statements about post-sepsis syndrome is TRUE?
    a)   Less obvious symptoms associated with post-sepsis syndrome include difficulty concentrating, sleep disturbances, loss of self-esteem
    b)   Cognitive function improves in post sepsis syndrome.
    c)   As many as 75% of sepsis patients develop post-sepsis syndrome.
    d)   Post-sepsis syndrome is time limited and has short-term effects.

8) Of the following statements, which one is correct?
    a)   A person is hospitalized in the United States every 35 seconds for sepsis.
    b)   Sepsis is the second leading cause of death in hospitalized patients.
    c)   Deaths from prostate cancer and opioid overdoses combined outnumber deaths from sepsis.
    d)   Sepsis is the second most expensive condition in the United States to treat.
    e)   The majority (about 87%) of sepsis cases occur in the community, not in the hospital.

9) Individuals who have had sepsis are at high risk to have a sepsis recurrence.
    a)   True
    b)   False

10) Which of the following practices is NOT best practice for sepsis patients?
    a)   Serum lactate levels
    b)   Broad-spectrum IV antibiotics
    c)   Aspirin orally 324mg
    d)   Rapid-administration of 30mL/kg crystalloid

11) Which of the following is not a common symptom of sepsis?
    a)   Elevated temperature
    b)   Tachycardia
    c)   Tachypnea
    d)   Hypertension

12) For every hour of delayed treatment in a septic patient, the risk for death increases by:
    a)   8%
    b)   25%
    c)   50%
    d)   Time does not increase risk for death.

13) Sepsis is characterized by:
     a) A form of blood infection
     b) Bacteria that can affect certain organs
     c) The body's overwhelming response to an infection
     d) A blood clot, preventing blood from flowing to limbs and organs

14) Of the following, which populations are at highest risk to develop sepsis?
     a) Patients with a necrotic wound, compromised immune system, or recurrent UTI.
     b) All patients with a pressure ulcer.
     c) All patient with recurrent pneumonia.
     d) Patient with a recent UTI

15) Systemic Inflammatory Response Syndrome (SIRS) criteria includes:
     a) Elevated temperature, tachycardia, tachypnea, hypothermia, and leukocytosis.
     b) Hypertension and mental confusion
     c) Hypotension, tachycardia, elevated serum creatinine
     d) Leukopenia, tachypnea and bradycardia

16) An infection plus 2 or more SIRS criteria is indicative of:
     a) Sepsis
     b) Septic shock
     c) Post-sepsis syndrome
     d) All of the above

Appendix D

Post-Sepsis Screening in HHC Patients Volunteer Assessment

1. On a scale 1 to 5 how easy was it to incorporate sepsis screening into your current workflow?

    Hard   1   2   3   4   5   Easy

2. On a scale of 1 to 5, how easy is it to use the sepsis screening tool?

    Hard   1   2   3   4   5   Easy

3. Now that you've been screening some of your patient population only some of the time, would you recommend screening all Home Hospital Care patient's at every visit?

    Yes   No   Not sure

4. Now that you've been screening some of your patient population only some of the time, would you also recommend screening all Home Care patient's at every visit?

    Yes   No   Not sure

5. On a scale 1 to 5, do you see completing the sepsis screening tool as a valuable addition to increase patient safety?

    No   1   2   3   4   5   Yes

6. I also want to know if any components of the screening need further clarification. On a scale 1 to 5, how would you rate the clarity and conciseness of the items in the sepsis screening tool?

    Not Concise/Clear   1   2   3   4   5   Clear/Concise

(Gronseth, 2021b)

Appendix E

DNP HHC Sepsis Screening Project Email

Hello ***,

This letter is regarding the quality improvement project, Screening and Early Recognition of Sepsis in Home Hospital Care and Home Care patients that is led by Tina Gronseth, Doctor of Nursing Practice student at St. Catherine University and nurse practitioner with the Home Hospital Care group.

You were recommended to me by one of your colleagues because of the high quality of work you put forth with the Home Hospital Care patients.

I am writing to you today to see if you would consider volunteering your time to perform the Allina sepsis screen and protocol on every Home Hospital Care patient that you see for 3 weeks. Volunteering to do this will allow me to compare triggered screens for sepsis with sepsis screening at every visit for impact on workflow, effectiveness, and feasibility. As a way to say thank you for your time and input, I would like to offer you a $20 Target or Speedway card.

Should you decide to volunteer, please fill out the attached consent form and send it back to me with your name, email, phone, and the date you plan to start screening. Since you have the sepsis education, you may begin screening your Home Hospital Care patients as soon as you send the consent back to me. The end of the 3-week period will be from the day you start screening.

I would sincerely appreciate your time and input related to volunteering for this project. Thank you for helping me advance the practice of nursing and for providing the best care to our patients.

Sincerely,
Tina M.S. Gronseth, CNP, DNP-C
Doctor of Nursing Practice Student
St. Catherine University
612-963-6097 - Cell

Appendix F

Homecare Staff Sepsis Knowledge Retention Assessment and Staff Perceptions of Sepsis Education Module

**Please use the unique identifier that you created for the Demographics assessment. This includes the first initial of your mother's first name and maiden name plus the four digits of your birth year (i.e., LB1956). Please keep this in a secure spot as you will need this going forward to enter the surveys. ** This survey will reflect knowledge retention after having implemented the sepsis education and tool into practice. It will also give participants an opportunity to share their perception regarding the education session.

1. What is your job title?
    b) Home Care Nursing Staff
    c) HHC NP/MD/Staff

2. Which is NOT a Systemic Inflammatory Response Syndrome (SIRS) criteria?
    a. Hyperthermia >38.7° C
    b. Hypothermia <36°C
    c. Tachycardia >90 bmp
    d. Tachypnea >24 breaths/minute
    e. WBC count >12,000µL or <4,000µL
    f. Normal WBC with >10% bands
    g. Hyperglycemia <140 mg/dL

3. The two most common sites of infections among adults with sepsis are _____ and _____.
    a. Lung, Urinary Tract
    b. Airway, Gut
    c. Abdominal, Skin/soft tissue
    d. Urinary, Intestinal

4. The all-cause mortality rate for the patient who develops sepsis in the acute care setting is:
    a. 20% (one in 5)
    b. 50% (one in 2)
    c. 75% (3 out of 4)
    d. 80% (4 out of 5)

5. According to Buchman et al. (2020), the all-cause mortality rates for United States Medicare beneficiaries who survived sepsis following hospital admission is:
    a. 45% in two years
    b. 60% in three years
    c. 75% in three years
    d. 65% in five years
    e. 75% in five years

6. Which of the following statements is correct?
    a. Severe sepsis is the failure to respond to IV fluid resuscitation (i.e.,
        perfusion) attempt
    b. Severe sepsis always follows sepsis
    c. Organ dysfunction is associated with severe sepsis.
    d. Sepsis can be classified as sepsis and severe sepsis.
    e. Severe sepsis and sepsis is distinguished by ability to respond to fluids.

7. Which of the following conditions increase an individual's risk for infection and
    sepsis. (select all that apply)
    a. Patient actively receiving chemotherapy
    b. Patient with a central or peripheral intravenous line
    c. Patient with RA on chronic steroid use
    d. Patient with liver cancer.
    e. Asplenia
    f. Patient with a dehisced abdominal incision

8. Which of the following statements about post-sepsis syndrome is TRUE?
    a. Less obvious symptoms associated with post-sepsis syndrome include
        difficulty concentrating, sleep disturbances, loss of self-esteem
    b. Cognitive function improves in post sepsis syndrome.
    c. As many as 75% of sepsis patients develop post-sepsis syndrome.
    d. Post-sepsis syndrome is time limited and has short-term effects.

9. Of the following statements, which one is correct?
    a. A person is hospitalized in the United States every 35 seconds for sepsis.
    b. Sepsis is the second leading cause of death in hospitalized patients.
    c. Deaths from prostate cancer and opioid overdoses combined outnumber
        deaths from sepsis.
    d. Sepsis is the second most expensive condition in the United States to treat.
    e. The majority (about 87%) of sepsis cases occur in the community, not in
        the hospital.

10. Individuals who have had sepsis are at high risk to have a sepsis recurrence.
    a. True
    b. False

11. Which of the following practices is NOT best practice for sepsis patients?
    a. Serum lactate levels
    b. Broad-spectrum IV antibiotics
    c. Aspirin orally 324mg
    d. Rapid-administration of 30mL/kg crystalloid

12. Which of the following is not a common symptom of sepsis?
    a. Elevated temperature

    b. Tachycardia
    c. Tachypnea
    d. Hypertension

13. For every hour of delayed treatment in a septic patient, the risk for death increases by:
    a. 8%
    b. 25%
    c. 50%
    d. Time does not increase risk for death.

14. Sepsis is characterized by:
    a. A form of blood infection
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    c. All patients with recurrent pneumonia.
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16. Systemic Inflammatory Response Syndrome (SIRS) criteria includes:
    a. Elevated temperature, tachycardia, tachypnea, hypothermia, and leukocytosis.
    b. Hypertension and mental confusion
    c. Hypotension, tachycardia, elevated serum creatinine
    d. Leukopenia, tachypnea and bradycardia

17. An infection plus 2 or more SIRS criteria is indicative of:
    a. Sepsis
    b. Septic shock
    c. Post-sepsis syndrome
    d. All of the above

18. How would you rate your perception of the sepsis education content?
                    (Poor) 1 2 3 4 5 (Excellent)

19. How would you rate accessibility of the sepsis education content?
                    (Poor) 1 2 3 4 5 (Excellent)

20. How would you rate the quality of the patient sepsis education zone tool?
                    (Poor) 1 2 3 4 5 (Excellent)

21. How would you rate patient receptivity of sepsis education zone tool?
                    (Poor) 1 2 3 4 5 (Excellent)

22. How would you rate the home care sepsis documentation site?
                    (Poor) 1 2 3 4 5 (Excellent)

23. How easy would you rate the sepsis screening process?
                    (Poor) 1 2 3 4 5 (Excellent)

24. How long did it take you to complete the sepsis education session? _____ minutes

25. How often would you recommend receiving sepsis education? (in months)
                    6   9   12   18   24

26. Would you recommend this be a part of new hire orientation?
                    Yes   No   Undecided

27. Other recommendations for improvement?
        _____

                                                        (Gronseth, 2021c)

Appendix G

St. Catherine University IRB Letter

ST. CATHERINE
UNIVERSITY

2004 Randolph Avenue

St. Paul, MN 55105

www.stkate.edu

St. Catherine University IRB   *QI Protocol Notification*

To: Tina Gronseth

From: David Chapman, IRB Co-Chair

Subject: Protocol #1609

Date: 09/01/2021

The protocol **1609. Screening and Early Recognition of Sepsis in Home Care Patients** has been verified by the St. Catherine University Institutional Review Board as a **Quality Improvement Project**, and accordingly does not meet the definition of "research" at to 45CFR46.102(d), which is "a systematic investigation, including research development, testing and evaluation, designed to contribute to generalizable knowledge." Your protocol is thus exempt from IRB review and therefore no review or oversight by the St. Catherine University Institutional Review Board is required. You are **approved** to begin your quality improvement project at any time.

Please note that under this determination, you may publish your findings but you may not refer to this as a research study.

Please note that changes to your protocol may affect its exempt status. If the project changes such that you are conducting research with human subjects, please contact me directly or the IRB Coordinator to discuss any changes you may contemplate.

Thanks,

David Chapman,

IRB Co-Chairddchapman@stkate.edu